International Test Mining Workshop

16 – 17 December 2024, Bremen, Germany,

Hosted by Germany and Belgium

Scientific and Legal Aspects of Test Mining

Workshop Report

Compiled by: Klaus Lucke and Harald Ginzky (German Environment Agency, UBA), Sabine Gollner (Royal Netherlands Institute for Sea Research, NIOZ), Pradeep Singh (Research Institute for Sustainability, RIFS), and Steven Vandenborre (Belgium Directorate-General for the Environment, FOD VVVL-SPF SPSCAE). On behalf of the organizers.

Suggested citation: Lucke, K., Ginzky, H., Gollner, S., Singh, P. Vandenborre, S., 2025. Scientific and Legal Aspects of Test Mining – International Workshop, 16-17 December 2024, Bremen, Germany. Workshop Report.

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1. Executive Summary

The workshop was attended by over 60 participants, with representation from Member States, the ISA Secretariat, observers, contractors, scientific entities, researchers and civil society groups.

With an ambitious agenda (see Annex I) and various presentations from scientists and contractors as well as the many in depth discussions, the workshop was deemed as very constructive and helpful by participants. In particular, the very participatory formats of the workshops (world café, campfire discussions, break-out groups) allowed for extensive and open deliberations.

There was a general consensus on the need for a mandatory test mining as part of an exploitation contract in principle, as well as on a number of specific aspects of test mining. However, a consensus could not be reached concerning a specific proposal for test mining as a requirement in the exploitation regulations. A number of open questions remain, inter alia, regarding the point in time in the process when test mining needs to be undertaken. Contractors argued for flexibility, whereas Contracting Parties requested good governance in order to ensure that no negative effects may occur to the marine environment and to avoid becoming liable due to “avoidable” damages to the marine environment. They stressed their responsibilities to maintain and protect the common heritage of mankind in the interest of all.

There seemed to be consensus that test mining is necessary as only field data allow for a realistic assessment of potential effects of a specific technique. A majority seems to be in favour of mandatory test mining prior to an application. A majority also seems to be in favour of test mining in several steps. Small-scale, but meaningful test mining before the application is submitted and an additional second step of test mining - more or less ‘full scale’ - before the start of commercial mining.

The workshop discussed the factual/scientific requirements of test mining projects, but consensus could not be reached. There was a general consensus that the factual/scientific requirements need to be determined according the general regulatory concept of test mining – before or after the application or as a two-step approach.

There was also consensus that modelling will need to be used in order to submit an Environmental Impact Assessment. It was highlighted that there is a need to understand better the modelling opportunities, challenges and risks in order to determine what kind of field data are in fact required.

The workshop also discussed the topic of benefit-sharing, i.e., the sharing of revenues that are gained from test mining activities. There was broad agreement that test mining activities should not be used as a pretext for actual mining, and therefore, safeguards should be put in place – including through having a clear legal definition for commercial production. Nevertheless, since there is the potential of revenue generation from testing activities, there is the need to design a proper accounting mechanism as well as the designation of the legal obligation for such revenues to be paid into the benefit-sharing mechanism (which is currently under negotiation).

Finally, the workshop briefly discussed a first draft standard presented by the hosts (see Annex II) as a means to stimulate discussions, which could perhaps be used as a basis for further consideration. Written comments to the draft were also received after the workshop (see Annex III).

In summary, although no consensus concerning a specific proposal could be reached, the detailed discussions during the workshop clarified the perspectives and the concerns which need to be further considered by state parties in future elaborations on this topic.

2. Words of Welcome

Dr. Andreas Bovenschulte, First mayor of Bremen and President of the Senate of Bremen

Dr. Bovenschulte warmly welcomed all participants to the workshop, co-organised by Germany and Belgium. He pointed out that Bremen is the right location for this task of its very large maritime tradition. Dr Bovenschulte said that Bremen could contribute to the topic of the workshop due to its centres for maritime research inter alia the MARUM, the Alfred-Wegner-Institute, the Leibniz-Center for Marine Tropical Ecology and the Max-Planck-Institute for Marine Microbiology. Over 1500 scientists work on maritime topics in Bremen and could help to contribute fundamental knowledge to answer the many questions concerned with possible deep-sea mining, given that we still know very little about the ocean floor. He stressed that mankind is confronted with many conflicting challenges with sometimes also contradicting implications as we have to fight global warming, but we need scarce metals to bring forward the transformation to clean energy – the "Energiewende" with large battery storage, electric vehicles, solar panels, windmills and hydrogen technology. Unfortunately – as he said - we still work in a manner of using up the natural resources and are far away from a circular economy with little or no need for new raw materials. In his view the question of how we want to live and to use the resources of our planet is a central one in this debate. He stressed the importance of the workshop as an opportunity to discuss how to set high international standards for deep-sea mining, which is environmentally compatible, sustainable and fair in terms of development policy.

Leticia Carvalho, Secretary General (then Elect) of the International Seabed Authority

In her keynote address, Ms. Carvalho (then Secretary-General Elect) expressed her appreciation to the hosts, Germany and Belgium for organizing the workshop. She also expressed her gratitude to member States for the trust they have placed in her in electing her to the position of Secretary-General. Noting that she would assume office in about two weeks' time, Ms Carvalho said she was looking forward to working with member States in furthering the mandate of the Authority. Ms Carvalho recorded her appreciation to member States for diligently continuing intersessional work on the Mining Code, which will contribute constructively when the Council resumes its work in March. She noted that the theme of test mining is one of about 10 of such thematic intersessional work. Ms Carvalho noted that the revised consolidated text was recently released by the President of the Council, and specifically on test mining, there are now two alternative text proposals, as reflected in DR 48 ter and DR 48 ter alt. She observed that the outcomes of the workshop will hopefully bring something to the table for the Council to consider in March. She stressed that the topic of test mining is an important one, as it will help member States and stakeholders better understand what a commercial mining operation could look like, including the potential impacts. And help the Authority to better regulate activities in the Area, not just through setting appropriate regulations, binding standards and guidelines, but also to create a level playing field and allow for informed decision-making. Ms Carvalho concluded by underscoring that such technical and scientific workshops, convened intersessionally and with the input of experts, will allow member states to work towards a more robust outcome with respect to the Mining Code. She congratulated the organizers, Germany and Belgium, for convening this workshop, thanked all of the participants for their contribution, and said that she is looking forward to warmly welcoming everyone to Kingston in March 2025.

3. Introduction

The workshop kicked off with an introduction of the objective of the international workshop in Bremen on 16 and 17 December 2024. Three topics took centre stage:

- Scientific and technical requirements for the implementation of Test Mining projects such as technical, temporal and spatial scales.
- Legal categorization of Test Mining, in particular the 'investigation obligations' and at what point in time - before or/and after the application is submitted, scope for design for operators.
- Royalties and benefit sharing.

The discussions were based on extensive intersessional deliberations over the last two years. This intersessional work was mostly led by Germany and provided several reports to the Council.

In the last consolidated version of the draft regulations two versions of Draft regulation 48ter were included. They followed a different regulatory concept. Draft regulation 48ter is based on the assumption that test mining needs to be mandatory before for the submission of a plan of work (PoW). Through a *test mining study,* field data should be gathered to provide the evidence that no harmful effects on the marine environment will occur. These field data should feed into the EIS and the EIA which are an essential part of the application for the approval of a plan of work. Draft regulation 48ter alt, instead, assumes that the evidence that no harmful effects will occur is only needed before commercial production commences. Draft 48ter alt provides flexibility as to when contractors wish to undertake the test mining, before or after the application for a PoW.

The factual/scientific requirements in spatial, temporal and technical terms will depend on the legal placement of the necessity of test mining, and vice versa, the legal placement of test mining will have an effect on the permission procedures as well as on its intended outcome. If there is a ramp-up concept for test mining, these requirements may need to get more comprehensive and stricter depending on the closer such testing gets to commercial production.

Finally, test mining projects in themselves pose a risk to the marine environment. Following the intersessional work, there was broad understanding that a specific permission procedure would need to be established, including an own Environmental Impact Assessment of the test mining project and public participation procedure, although clarity is needed on a case by case basis and depending on the placement of test mining. For instance, if testing is placed during the exploitation stage, the EIA presented together with the application for the approval of a plan of work for exploitation might already sufficiently cover testing projects.

The workshop was intended to be structured as follows:

- Open discussions on the first day to set the scene – concerning the legal and the factual/scientific questions
- Discussion of a specific proposal to be presented by the hosts on the second day – based on the first day´s deliberations.

The workshop was attended by over 60 participants, with representation from Member States, the ISA Secretariat, observers, contractors, scientific entities, researchers and civil society groups.

4. Presentations

1. **Harald Ginzky** (German Environment Agency, UBA): *Test mining for exploitation activities – Introduction to Workshop*: The purpose of this presentation was to outline the topics and the purpose of the workshop. It provided also some background information for the discussions to be held during the workshop. The contents of the presentations are mentioned in the section "introduction" of this report.
2. **Sabine Gollner** (Royal Netherlands Institute for Sea Research, NIOZ): *Test-mining (TM): environmental and technical aspects*: The presentation first addressed the different ecosystems associated to resources, explaining that the focus of this workshop would be on nodules only. Second, the overall spatial and temporal environmental effects after mining were shown, and how these scales relate to monitoring. Third, the questions that should be discussed by the participants were explained, including purpose of TM, Monitoring of TM, and Scales of TM.
3. **Kris Van Nijen** (Global Sea Mineral Resources): *Test Mining – The Contractors' View*: This presentation provided some insights on test mining from the perspective of contractors, including how contractors perceive the purpose of test mining, including the degree of certainty and the cost factor involved. The presentation also suggested some key objectives that test mining could deliver from a practical perspective, which could inform regulatory decisions.
4. **Corey McLachlan** (Nauru Ocean Resources Inc (NORI): *NORI Test Mining*: This presentation provided an overview of the recent NORI test mining project, including the project objectives, preliminary outcomes, lessons learned and an outline of the next steps for NORI.
5. **Pradeep Singh** (Research Institute for Sustainability, RIFS): *Test Mining Overview of legal aspects*: This presentation provided an overview of the legal aspects surrounding the topic of test mining, including provisions under UNCLOS, as well as the potential situating of test mining (e.g. before exploitation and/or as an intermediate step). Other topics that were covered include the role of exemptions, the procedural and decision-making process, as well as the link between test mining and concepts such as material change, validation monitoring, technological readiness levels, and the certification of equipment or processes.
6. **Corey McLachlan** (Nauru Ocean Resources Inc (NORI): *Proposed text for payment of royalties on test mining*: This presentation presented a contractor's view on the topic of royalties (i.e. payment to the benefit sharing mechanism) from revenues generated through test mining, if any (since most of the minerals recovered will be used to test processing systems, etc.). Topics covered include when contractors should be required to make royalty payments on revenues generated, and how this requirement could be reflected in the exploitation regulations.
7. **Hannah Lily** (Independent Legal Consultant, UK): *Benefit Sharing and Revenue from Test Mining*: This presentation provided a legal analysis on the topic of royalties and the payment of revenues from test mining into the benefit sharing mechanism. Some of the key questions tackled in this presentation include how to insert safeguards in the regulatory framework to ensure that contractors are not incentivized to prolong test mining activities to generate revenue, as well as how royalties should be charged and how the revenues should be shared.

8. **Harald Ginzky** (German Environment Agency, UBA): *Test mining for exploitation activities – A specific proposal–options and food for thought*: This presentation was intended to summarize the discussions of the first day – both on the factual/scientific as well on the legal questions – and to set the scene for the second day and the discussion of a potential proposal presented by Germany and Belgium.

The slides of all presentations can be downloaded separately at the ISA website under https://www.isa.org.jm/session-30-council-part-1-march-2025/ (-> Thematic discussions -> Test Mining).

5. Results

i. Legal/policy deliberations

The workshop discussed legal/policy questions through a "campfire discussion" as well as breakout groups. This section is intended to summarize the legal/policy deliberations and results of the workshop, noting that the workshop was a technical workshop and not a negotiating forum. The following summarizes some key points where a general consensus seemed to emerge amongst workshop participants.

(1) Objectives of test mining

- There was general consensus that TM should increase the level of certainty of the information provided.
- TM should provide the appropriate level of certainty of information to assess
- The impacts and effects on the marine environment,
- The performance and capabilities of the operator, and the efficiency and economic viability of the exploitation as well as
- The efficacy of safety systems and monitoring systems.

(2) **Need for high level of certainty of information before commercial production commences**

- There was general consensus that a high level of certainty of information on the three aspects mentioned under (1) is necessary before commercial production commences.
- A legal definition of "commercial production" is anticipated in UNCLOS. A definition is incorporated in the current Schedule - Use of terms and scope in the Draft regulations.

(3) Main concerns to be taken into account concerning the requirements and the design of a regulation of test mining

The following four concerns were raised amongst the workshop participants to be addressed when drafting a regulation for TM:

- To ensure that the marine environment is effectively protected
- Parties could comply with their responsibilities concerning good governance for the common heritage of mankind
- TM as regulated needs to be cost-effective
- To avoid liability of Parties being sponsoring states

(4) TM must not allow for "real mining"

- There was general consensus that TM must not be misused for real (commercial) mining activities.

(5) TM before or after the application for a PoW

- There was support, but no consensus, that TM should be mandatorily undertaken before an application for a PoW could be submitted.
- Contractors requested flexibility, with room for a choice by the applicant/Contractor.

- The core argument for a mandatory TM before the application is that reliable information is available to assess the effects on the environment by using a specific technique. This needs to include field data.

(6) The option of a "ramp-up" concept for TM

- There was interest in further examining a ramp-up concept of TM.
- Ramping up was meant as a system where field data needed to be provided by the contractor at several points of the whole process up to commercial production, being it a twofold concept or even a threefold mechanism.
- The two or three steps could involve:
    - TM before the application in a limited scale
    - TM before the commercial production: more or less full-scale
    - Validation monitoring system: Before or after the start of the commercial production to ensure that all requirements of the EMMP are met

(7) TM before the application: what means "integrated test"?

- TM before an application could be an "integrated test". It was questioned whether this is necessary in all cases. It was argued that a component test may be sufficient if it could be ensured that the potential cumulative effects of all components together will be assessed otherwise. But if an integrated test would be conducted, it should be conditioned by sufficient safeguards (including environmental).

(8) TM and best available technology

- It was highlighted that the need for TM may change over the time if techniques evolve and even get recognized as being "best available technology" (BAT).
- This argument was not extensively discussed.
    - TM may still be necessary even if recognized as BAT as the effects may vary according to the specific environmental conditions of the mining area.
    - Being best available technology would mean that such a technology would have to be applied by all contractors in a specific context.

(9) Field data and modelling: the interface

- The workshop participants agreed that modelling will always be necessary to assess the effects on the environment.
- To understand the interplay of modelling and field data is therefore necessary. To be able to do it a better understanding of modelling in itself is required.
    - Only field data can help to improve the modelling system by verifying the outcomes of the models.
    - The better the models get; the lesser field data may be required.

(10) Regulatory approach

- The regulatory approach needs to take into account all the aspects mentioned before.

(11) Standard for factual/scientific requirements

- The workshop hosts presented a first draft standard for the factual/scientific requirements. The participants were not able to discuss the draft in detail but there was an initial exchange of views.
- There was general consensus that the standard should address the requirements for the technical, spatial and temporal scale of TM projects and the requirements for monitoring, dependent on the positioning of TM (before or after application, or a ramp-up concept).
- The requirements should also allow for the verification of the models applied.
- The contents and the requirements of such a standard will depend on the legal sittings or in case of a ramp-up concept the legal sittings of each TM.
- The draft standard is attached to this report, accompanied by comments submitted after the workshop by some participants.

(12) Exemption system

- The exemption system was not discussed in detail. Contractors voted for more flexibility.
- State representatives stressed that the exemptions should only apply in really exceptional cases.
- The view was expressed that exemption systems may be used only sparingly during the first years or decades of extraction, and can subsequently be granted with more leniency after sufficient experience has been gained.

(13) Permission procedure for test mining projects

- There was also no detailed discussion on the design, the structure and the requirements of a specific permission procedure for test mining projects.
- There was consensus that this needs to be clarified.
- Aspects to be considered included:
    - Should the procedure be regulated by the exploration or the exploitation regulations?
    - Which organ should be in charge?
        - Pursuant the current regulation it is the LTC, but this was questioned by some state representatives.
    - Strong support was for the need to have a specific EIA for test mining projects.

ii. Scientific and Technical Questions on Test Mining

The topic of technical and scientific aspects of Test Mining (TM) was introduced by Dr. Sabine Gollner (NIOZ, The Netherlands) in her presentation on 'Input on core questions of scientific and technical requirements of Test Mining' (see Chapter 3). The main aspects discussed were:

- Purpose of test mining
- Monitoring of Test Mining
- Spatial and temporal scales of Test Mining

Discussions were focussed on Test Mining of polymetallic nodules. Six questions were distilled prior to the workshop covering these aspects as starting point for the discussions among workshop participants. To allow for a constructive and thorough exchange of views and ideas, discussions were organized in a World-Café style in six break-out groups (consisting of 8-10 attendees each). The question raised were:

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6 groups: 2 question rounds (for each round 30 minutes to discuss)

Round 1:

Question Topic 1: Purpose of Test Mining

Do you agree with the purpose of TM as stated in the draft Schedule/Reg 48 ter/Reg 48 ter alt?

Questions Topic 2: Monitoring of Test Mining

Does the standard of draft EMMP apply fully to TM?
Is an own EMMP standard for TM needed?
How long should monitoring occur after TM?
Only validation, or also compliance and long-term monitoring?
PRZ and IRZ for each TM site?

Round 2:

Questions Topic 3: Scales of Test Mining

What technical components need to be considered and what is the scale of technical components?
What is the time scale of TM?
What is the spatial scale of TM?
Should a TM standard include qualitative descriptions ("criteria") and/or concrete numbers for time/spatial/tonnage scales?

Topic 1: Purpose of Test Mining

Q:Do you agree with the purpose of TM as stated in Schedule/Reg 48ter /Reg 48 ter alt?

Topic 2: Monitoring of Test Mining

Qs: Does the standard of draft EMMP apply fully to TM? I an own EMMP standard for TM needed? How long should monitoring occur after TM? Only validation, or also compliance and long-term monitoring? PRZ and IRZ for each TM site?

Topic 3: Scales of Test Mining

Qs: What technical components need to be considered and what is the scale of technical components? What is the temporal scale of TM? What is the spatial scale of TM? Should a TM standard include qualitative descriptions ("criteria") and/or concrete numbers for time/spatial/tonnage scales?

A short synopsis of the discussions and results were presented to plenary by the six leads subsequently. The main deliberations and the outcome in the break-out groups were:

Topic 1: Purpose of Test Mining

The most important purpose of Test Mining is about reducing uncertainty and gaining confidence in the performance to mine and monitor. This includes the testing of technologies but also the demonstration of the ability of the contractor to be able to perform.

Step-wise Approach:

The contribution of Test Mining to the evolution of mining and monitoring equipment will result from the combination and comparison of individual Test Mining activities (i.e., developing state of the specific technologies). But even if Test Mining activities use proven technologies the specific combination of the chosen parts of the system will need to be tested. It was noted that there needs to be responsible bodies (suggestion: LTC) and procedures implemented to make sure that BATs are identified and contractors are obliged to use those and replace outdated technologies.

Some participants thought that TM does not necessarily have to include all components or be full-scale, but definitely all components that have major impacts. While for some participants the most important component to be tested is the collector, more generally, every component that could have an environmental impact should be tested. Others thought that all components must be tested and monitored to adhere to UNCLOS. NGO representatives raised the question whether the effect, e.g., of noise on the environment can be properly assessed during test mining with down-sized components because some systems may emit less underwater noise than others and the link between size of the system and the propagated noise might not be linear. Assessing cumulative effects may require integrated testing, unless it can be proven (by the contractor) that no cumulative effects would arise.

While the aspect of technology development and testing may decrease over time, Test Mining will continue to be relevant to (1) show that the equipment is handled in a way that keeps up with requirements for commercial mining and (2) to demonstrate that impacts and environmental consequences in a given ecosystem stay within the limits identified in the EIS.

While no consensus was found on this subject, there was a clear trend in contributions from all stakeholder groups towards a staged approach in Test Mining (ramp-up process), from components test to increasingly larger scale test (see example provided by UK: **Error! Reference source not found.**). In this context, concern was raised that Test Mining and commercial mining may be hard to separate. Participants agreed that the modality of the test changes depending on whether the TM takes place before or after the submission of the Plan Of Work (PoW). Testing of single components, or multi-components if cumulative effects are expected, and scaled component for modular system should be carried out before the submission of the PoW.

Impact monitoring: on the mining technology it was noted that the demonstration of the ability to monitor the impact is similarly important. It needs to be demonstrated that impact monitoring is implemented in a way that puts the regulator in a position for timely recognition of non-compliance during commercial mining.

Demonstration that mining will have no harmful effects can only relate to agreed limits (e.g., relating to the amount of nodules removed / the area blanketed with resettling sediments / the fauna lost from a specific area) as any mining will of course harm at least the local environment (by habitat

removal, sediment plumes…). In that sense the addition “as described in the EIS” or “not in excess of what is described in the EIS” (to the Schedule/Reg 48 ter/Reg 48 ter alt) may be required.

There was, however, not full consensus among participants as some argued, that in order to assess impacts and effects on ecosystems it is crucial that Test Mining demonstrates the full integrated system as similar to the setup that will be used for the production phase, to account for cumulative and synergistic effects. Any other approach would also assume that impacts by individual components just sum up linearly in integrated systems. Others expressed the view that environmental impacts can and should be studied during component testing.

It was noted that the Law of the sea (Annex III, article 17) prescribes tests of integrated systems already as part of exploration (while ‘integrated’ is not explicitly mentioned, the rest of the text makes clear that this is what is meant). However, there was also the view that Test mining of an integrated, full-scale system would not be affordable by contractors, unless it takes part as the first part of the exploitation.

Moreover, if downscaled equipment is used for the Mining Tests, there is the risk that upscaling would not provide relevant information to correctly assess the impact (e.g., sound, plume density and spreading) and the expected environmental effects.

It was mentioned that ideally there should be a continuous learning on best technologies and procedures throughout Test Mining and the (cautious start / ramping up of) commercial mining.

In general, there is a legal obligation and due diligence obligation to adhere to UNCLOS. Participants from industry generally agreed that more flexibility in TM regulation would be more effective and therefore necessary; participants from policy and environmental ministries preferred the draft regulations 48 ter / 48 ter alt (one or potentially even both in a ramp-up process). Some participants expressed worries that more flexibility could increase the risk of non-compliance.

Specific comments made by workshop participants on Reg 48 ter and 48 ter alt:

- The reference to “Plan of Work” at the end of the regulation relates too much to exploitation. It should be re-worded to just relate to EIS instead.

- Use of the term “harm” (the marine environment): as every TM activity will cause harm, but not necessarily serious harm, the wording “least environmentally harmful technique” may be more appropriate.

- It was acknowledged that a ramp-up process would be important (i.e., component-testing, TM, Pilot TM). In this context, some regulatory agencies were supportive of Reg. 48 ter alt with pilot mining and validation modelling. Industry participants, on the other hand, were concerned that regulations on TM should not be too prescriptive and that, e.g., a mandatory adherence to both 48 ter and 48 ter alt would no longer be economically feasible. How much obligation or how much flexibility needs to be determined.

- Commercial viability as outlined in 48 ter alt is an important aspect for TM, but cannot be speculative or the main cause for TM.

- While not discussed in depth, participants agreed that Standards and Guidelines will be required for the different types of resources.

- Overall, it was advocated that high-level objectives should be dealt with in the regulation, while details should be defined in standards

Topic 2: Monitoring of Test Mining

Generally, the setup of the draft Environmental management and monitoring plan (EMMP) with monitoring during and after the test seems to apply also to Test Mining.

Timing and duration: The duration of Test Mining is expected to be rather short and, therefore, continuous 'validation monitoring' would be expected to apply to the full duration of Test Mining. However, views were presented that test mining on the temporal scale of weeks are rather useless and would suggest a month-long test mining as the first part of the exploitation phase.

This, in turn, lead to concerns, that if Test Mining is too closely associated with the start of commercial production, there is not enough time to appropriately assess environmental impacts beyond the end of the period of Test Mining operation and thoroughly validate that they agree with what was laid out in the EIA. There is the view that these aspects are reported as part of the EIS that precedes commercial production. As feasibility studies have to be performed 12 months before commercial mining, there would be enough time (note: it was not fully clear if feasibility study and test mining refer to the same activity).

After the end of the operation, long-term monitoring should apply to make sure that environmental consequences beyond immediate effects are addressed.

An important aspect was standardized monitoring approaches: It was stated that, when assuming that baseline studies are an integral part of TM, the sampling needs to be absolutely standardized because otherwise the environmental samples collected can't be compared between years, sites, etc. It was noted that under current EIS (exploration, small scale mining/component tests) data often can't be compared between contractors. Further, under insufficient standardization, no valid small- or large-scale comparisons can be made or processes be modelled. There have been attempts to standardize specific parts of baseline sampling, but these standards have not been implemented and they might need to be revised and be more stringent.

Topic 3: Scales of Test Mining

Consensus was reached that appropriate temporal and spatial scales that allow comprehensive analysis of impacts must be considered.

For Industry, the time and spatial scale depends on the amount and density of nodules that should be extracted. The scale would also be dependent on the aim/ goal of the TM and which technology is available. Academic parties stated that the temporal and spatial scale of TM is particularly important for proper baseline studies (which should be including in any TM), because currently the available baseline data are too scarce to differentiate between the effect of TM and the natural and spatial variability. Particularly natural temporal phenomena, such as El Niño effects on the CCZ have not been studied. It was also discussed whether migration patterns of migratory species should be included in TM plans, because of the vast size of the CCZ.

In synthesis, it was concluded that the temporal and spatial scales depend on specific objective of the TM, i.e., the use, size, scope, technical characteristics and potential environmental impact of a component or integrated component. With regard to environmental assessment, it was found that the choice of temporal and spatial scales varies depending on the environment. In the case of benthic environments, the spatial scale of TM would be of particular importance, and the spatial variability of biota and the heterogeneity of the seafloor must be taken into account. For pelagic

environments, the temporal scale should primarily be considered in order to assess biological responses.

With regards to qualitative descriptors versus concrete values for time/spatial/tonnage scale, it was overall considered to advise against requesting specific space and time scales. Industry representatives were rather opposed to standardization and argued that the whole process is already overregulated. Academia, in contrast, were in favour of standardization. Overall, it was recommended providing clear qualitative criteria and allowing contractors to determine the most suitable space and time to meet these criteria based on the features of the contract area, technology and the purpose of TM (e.g., component(s) vs. full-scale-integrated system), as well as potentially impacted target species and environments (e.g., benthic vs. pelagic). However, minimum or maximum scales might be determined.

iii. Legal Questions on Benefit Sharing

This session dealt with the specific topic of royalties to be charged on minerals extracted during test mining, how and when such royalties shall become payable to the Authority, and how the revenue received by the Authority should be shared. There seemed to be broad agreement that this aspect is one that is close to a solution. There was agreement that if there are revenues generated from test mining, royalties must be payable to the Authority. While there was no discussion on the rate of royalties, there were some views that the Authority should receive the bulk of the revenue. Contractors pointed out, though, that most of the minerals extracted will be used for testing purposes, i.e. metallurgical processing, and meanwhile, there will be expenses such as logistics and storage. It was pointed out that the value of the minerals that are extracted would be small when compared to the costs of the test mining project, since only a relatively small number of minerals will be recovered in this time. However, in response, it was also noted that test mining projects allow contractors to make other "gains", including additional investment, and thus must be taken into account since the minerals extracted are the common heritage of humankind. While the workshop did not discuss the rate of royalties, another topic that was discussed is when contractors would be required to make payment. Here, it was acknowledged that test mining should not amount to commercial production – and that test mining should not be used as a pretext for actual mining – which most participants felt would require safeguards. In this context, it is important to develop a clear definition for commercial production. In terms of when payment should be made, one suggestion was that royalties for test mining should become payable at a later date, i.e. when commercial production commences, or if a contractor chooses not to proceed with exploitation or is not able to move to exploitation (i.e. rejection of an application), then at the expiration of the exploration contract. Finally, there seemed to be broad agreement that any royalties paid to the Authority should be channelled into the benefit sharing mechanism that is to be developed by the Authority, as opposed to the Environmental Compensation Fund.

Annexes

Annex I: Agenda

Test-Mining Workshop

Bremen, Germany – 16. and 17. Dec. 2024

Draft Agenda *(subject to revision)*

15. December

- Icebreaker Reception: 18:00-21:00 ("The Lobby", RadissonBlu Hotel) by invitation of Germany

16. December, Day 1

Registration: 8.30 – 9.00 (at ‚Haus der Wissenschaft', Sandstrasse 4, 28195 Bremen)

Session 1: 9.00 – 9.30 Opening Session

Time	*Content*	*Speaker*
09.00 – 09.10	Welcome address	Steven Vandenborre (BEL)
09.10 – 09.20	Greetings	Dr. Andreas Bovenschulte, First major of Bremen and President of the Senate of Bremen
09.20 – 09.30	Housekeeping	Klaus Lucke, UBA

Session 2: 9.30 – 10.30 Setting the scene

Time	*Content*	*Speaker*	
09.30	*Session-Moderator:* Steven Vandenborre (BEL)		
09.30 – 09.50	Outline of Workshop	Harald Ginzky, UBA (GER)	Short introduction providing an overview of the technical and legal aspects to be discussed and the rationale for the workshop and its agenda.
09.50 – 10.10	Input on core questions of scientific and technical requirements of Test Mining		Sabine Gollner, NIOZ
10.10 – 10.30	View of private contractors		Kris Van Nijen, DEME

Coffee break 10.30 – 11.00

Session 3: 11.00 – 13.00 Factual requirements for Test Mining

Time	*Content*	*Speaker*
11.00	*Session-Moderator:* Klaus Lucke, UBA (GER)	

11.00 – 12.00	6 Break-out groups (World Café style) discussing the technical and scientific requirements of Test Mining
12.00 – 13.00	Report to plenary

Lunch break 13.00 to 14.00

Session 4: 14.00 – 15.30 Legal aspects

Time	*Contents*	*Speaker*
14.00 – 14.05	*Session-Moderator:* Harald Ginzky, UBA	
14.05 – 14.20	Overview of legal aspects	Pradeep Singh, RIFS (GER)
14.20 – 15.20	Camp fire discussion	5 Panelists + 2 free chairs

Coffee Break 15.20 – 15.40

Session 5: 15.40 – 17.30 Interface of technical and legal questions

Time	*Contents*
15.40	*Session-Moderator:* Harald Ginzky, UBA
15.40 – 16.30	6 Break-out groups discussing the interface of technical and legal questions
16.30 – 17.00	Report
17.10 – 17.30	Plenary discussion

- Dinner: Ratskeller 19.00 – 22.00 by invitation of Germany

17 December, Day 2

Session 1: 9.00 – 10.00 Benefit sharing of revenues gained by TM projects

Time	*Contents*	*Speaker*
09.00 – 09.10	Address by Leticia Carvalho	
09.10 – 09.15	*Session-Moderator:* Pradeep Singh, RIFS	
09.15 – 09.25	Perspective of contractors	Corey McLachlan, The Metals Company
09.25 – 09.40	Legal analysis	Hannah Lily, Independent Consultant
09.40 – 10.00	Plenary discussion and wrap up	

Session 2: 10.00 – 13.00 Discussion of a concrete proposal

Time	*Contents*	*Speaker*
10.00 – 10.05	*Session-Moderator:* Ingo Narberhaus (GER)	
10.05 – 10.20	Presentation of a specific proposal	Harald Ginzky, UBA
10.20 – 11.00	Plenary discussion	
11.00 – 11.30	**Coffee break**	
11.30 – 12.30	6 Break-out groups discussing the concrete proposal	
12.30 – 13.00	Report back to plenary	

Lunch: 13.00 – 14.00

Session 2: 14.00 – 15.00 Plenary discussion of a concrete proposal - continued

Moderator: Ingo Narberhaus (GER)

Session 3: 15.00 – 15.30 Concluding remarks

Presenters: Ingo Narberhaus

15.30 Adjourn

Annex II: Draft Standard for Test mining project before an application for a PoW is submitted

In order to stimulate discussions and exchanges among participants, the hosts presented a first draft of a potential Standard based on the views expressed on the first day of the workshop. This Standard is reproduced below, and could form the basis of further discussions.

(1) Purpose

The purpose of this standard is to determine the requirements which have to be fulfilled by a test mining project according to Exploitation regulation 48 ter paragraph 1.

(2) Scope of application

This standard is only applicable for test mining projects concerning the exploitation of polymetallic nodules.

(3) Purpose of test mining

Test mining should allow to determine that an activity concerning the exploitation of polymetallic nodules will not cause harmful effects to the marine environment pursuant to Article 145 UNCLOs and that the environmental quality standards pursuant to Exploitation Regulation ?? will be complied with.

It should allow to assess the performance, efficiency and economic viability of the exploitation as well as the efficacity of safety systems and monitoring systems.

The data should be the basis for the Environmental Impact assessment pursuant to Exploitation regulation?

Test mining should also be used to identify options to optimize the used techniques.

(4) Test Mining and Modelling

Together with modelling according to the latest standard of development for modelling, the field data gathered by test mining projects should enable to make the determination mentioned in (3) Sentence 1.

Data gathered by test mining projects should be used to evaluate and to continuously improve the accuracy of the models used.

(5) Contents

The contents to be addressed by the test mining should be related to the relevant aspects required for the EIS pursuant to Annex ?? Draft Regulation.

(6) Procedural prerequisites for the conduction of test mining projects

The contractor is only allowed to conduct a test mining project if a respective permission has granted by the international seabed authority pursuant (reference to revised provision in the exploration regulation or in the draft exploitation regulation) and a contract has been concluded

(7) Test mining requirement in general

The test mining requirements concerning technical, temporal and spatial scale need to be determined project specific.

(8) Technical scale of test mining projects

Concerning the technical scale of a test mining project for the exploitation of polymetallic nodules the following should be complied with:

- The test should at least evaluate all components including the cumulative effects of the integrated application of the various components

- The technical scale could be smaller than the full technical system. The required technical scale must be determined for each element and for the technical approach applied.

(9) Temporal scale of test mining projects

The duration of a test mining project for the exploitation of polymetallic nodules should last over a reasonable duration in order to provide the information required.

If there are significant difference of the potentially affected ecosystems due the seasons, the temporal scale needs to be chosen accordingly to take into account these differences.

(10) Spatial scale of test mining projects

A test mining project for the exploitation of polymetallic nodules should span over an appropriate number of spatially separated locations within the contract area in order to account for differences

(environmental, bathymetry, geology) in different areas.

The minimum size should be about 5-10 km2 for each of these fields.

(11) Capability for monitoring

The test mining project needs to show that the effects on the marine environment could be continuously monitored after the activity concludes.

(12) Test mining study – Documentation of results of test mining project

The results of the test mining project should be documented (in a test mining study) and be used to develop the “Environmental Impact Study” according to exploitation regulation? The documentation should also inform about the remaining uncertainties.

(13) Miscellaneous

Annex III: Contributions received prior/after the workshop - Comments on the Draft Standard for Test mining project

Comments received
(In order of date of receipt):

1. Yumiko Arai, Japan Organization for Metals and Energy Security (**JOGMEC**), Japan, received 15.01.2025
2. Anna Groß, CEO, **DEEPWAVE**, received 15.01.2025.
3. Felix Janssen, Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung (**AWI**), Germany, received 16.01.2025
4. Samantha Watts and Amber Chandler-Cobley, UN Ocean Negotiations, Marine and Fisheries Directorate, Department for Environment, Food and Rural Affairs, (**UK**), received 16.01.2025

General Comments:

1. JOGMEC:
   Thank you very much for your warm welcome at the workshop last month and I am grateful for your continued efforts for organizing the discussion.
   I submit the comments from JOGMEC on the proposed draft Standard as attached.
   We would appreciate it if you could take note that these are our views and comments and not those as the Japanese delegation.

Comments on the draft Standard for Test Mining project before an application for a PoW is submitted

Note, the comments described below are based on discussions held among member of JOGMEC and do not represent the opinions of Japanese delegation.

General Comments:

Standards are intermediate rules with the regulations as higher-level norms and the guidelines as lower-level norms. In that sense, deliberation is required when proposing draft standards while higher-level norms have not yet been established. In addition, this draft standard does not represent a compilation of the opinions of the workshop members, and therefore the significance of its submission is unclear. In other words, it must be made clear under whose responsibility this document will be submitted. At least, this draft should not be submitted as the consented opinion of the workshop participants.

Specific Comments:

(1) Purpose

We agree that regulations and standards should correspond to each other, but is paragraph 1 of 48 ter in the regulation sufficient?

(2) Scope of application

Since the scope of the current draft regulation for exploitation is not limited to polymetallic nodules, this scope of application here is unnatural. Can we understand that standards of polymetallic sulfides and cobalt-rich ferromanganese crust will be added in the future?

(3) Purpose of test mining / Para 1

If the standard refers to harmful effects, shouldn't it go into more detail? If it only refers to article 145 of UNCLOS, it should be stated in the regulations.

(3) Purpose of test mining / Para 2

The content of para2 in (3) Purpose of test mining is not consistent with the content of the regulation 48 ter. Also, when compared to the progress of the TM IWG's discussions to date, it seems abrupt that economic viability of the exploitation, efficiency of safety systems and monitoring systems are mentioned here.

(3) Purpose of test mining / Para 4

It is natural for contractors aim for optimal development based on information obtained through TM etc., so is there a need to stipulate this in the standard?

(4) Test Mining and Modelling / Para 1

Does “the latest standard of development for modelling” refer specifically to a particular standard to be referenced? If not, we suggest the following modification as a general expression.

“Together with modelling according to the latest modelling techniques, […]”

(6) Procedural prerequisites for the conduction of test mining projects / Para 1

Since the meaning of the word “permission” is ambiguous, we propose the following amendment.

” The contractor is only allowed to conduct a test mining project under a contract with the international seabed authority.”

(10) Spatial scale of test mining projects / Para 2

Since a standard is legally binding documents, if a certain size is to be specified, there must be sufficient scientific evidence that the stakeholders can agree on. Does the 5-10 km^2 shown here have such evidence?

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2. **Anna Groß, DEEPWAVE:**
   Dear Ingo, Harald, Klaus, Sabine, Pradeep and Steven,
   after reading the draft again, I am convinced that every detail that we discussed in our workshop has been included in the protocol.

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3. **Felix Janssen, AWI:**
   Dear Steven and Harald,

thanks for organizing the workshop and moving the issue forward. I hope you can still accept my input (attached). Just couldn't make it before today.

Draft Standard for Test mining project before an application for a PoW is submitted

(1) Purpose

The purpose of this standards is to determine the requirements which have to be fulfilled by a test mining project according to Exploitation regulation 48 ter paragraph 1.

(2) Scope of application

This standard is only applicable for test mining projects concerning the exploitation of polymetallic nodules.

(3) Purpose of test mining

Test mining should allow to determine that an activity concerning the exploitation of polymetallic nodules will not cause harmful effects to the marine environment pursuant to Article 145 UNCLOs and that the environmental quality standards pursuant to Exploitation Regulation ?? will be complied with.

It should allow to assess the performance, efficiency and economic viability of the exploitation as well as the efficacity of safety systems and monitoring systems.

The data should be the basis for the Environmental Impact assessment pursuant to Exploitation regulation ??.

Test mining should also be used to identify options to optimize the ~~used~~ techniques used for mineral collection and environmental monitoring.

(4) Test Mining and Modelling

Together with modelling according to the latest standard of development for modelling, the field data gathered by test mining projects should enable to make the determination mentioned in (3) Sentence 1.

Data gathered by test mining projects should be used to evaluate and to continuously improve the accuracy of the models used.

(5) Contents

The contents to be addressed by the test mining should be related to the relevant aspects required for the EIS pursuant to Annex ?? Draft Regulation.

(6) Procedural prerequisites for the conduction of test mining projects

The contractor is only allowed to conduct a test mining project if a respective permission has granted by the international seabed authority pursuant (reference to revised provision in the exploration regulation or in the draft exploitation regulation) and a contract has been concluded

(7) Test mining requirement in general

The test mining requirements concerning technical, temporal and spatial scale need to be determined project specific. This needs to consider available knowledge, e.g., on the environmental consequences at different spatial and temporal scales and performance of specific components of mining and monitoring technologies at scales that are relevant for later exploitation.

(8) Technical scale of test mining projects

[Comment AWI: I think this should be defined. Is this referring to the scale of the technical equipment (e.g., a collector with a 1:1 or 1:2 width of the collector that shall be used for exploitation) or is this broader (including, e.g., how fast a collector system travels or how long a continuous stretch of nodule removal is.]

Concerning the technical scale of a test mining project for the exploitation of polymetallic nodules the following should be complied with:

- The test should at least evaluate all components including the cumulative effects of the integrated application of the various components. Proven technology can only be excluded from test mining for components that do not contribute to effects even if they fail.
- The technical scale could be smaller than the full technical system as long as they can be operated in a way that ensures that the total impact matches what is expected for exploitation. The required technical scale must be determined for each element and for the technical approach applied.

(9) Temporal scale of test mining projects

The duration of a test mining project for the exploitation of polymetallic nodules should last over a reasonable duration in order to provide the information required.

The duration is not restricted to the operation but includes post-operation monitoring for the period of time needed to close gaps in the available knowledge on physical impacts and environmental consequences. If there are significant difference of the potentially affected ecosystems due the seasons, the temporal scale needs to be chosen accordingly to take into account these differences.

(10)Spatial scale of test mining projects

A test mining project for the exploitation of polymetallic nodules should span over an appropriate number of spatially separated locations within the contract area in order to account for differences
(environmental, bathymetry, geology, biology) in different areas. Reference zones of similar environmental setting need to be established and sustained for the different locations selected for test mining to serve as reference for the assessment of mining performance, associated impacts, and environmental consequences and.

The minimum size should be about 5-10 km2 for each of these fields.

(11)Capability for monitoring

The test mining project needs to show that the effects on the marine environment could be monitored in case of an exploitation project.
[Comment AWI: I would add that this includes successful work at sea as well as the means for timely provision of key data to the regulator while the operation is underway (including technical means for data transmission from depth to surface to shore) and for generation of appropriate data products (potentially involving modeling / digital twin technologies). For sample-dependent information timely provision of delayed-mode data should also be demonstrated. This would provide the regulator with information on the test mining itself but – more importantly – would demonstrate how information necessary for compliance monitoring by ISA during a later exploitation phase will be made available.]

(12)Test mining study – Documentation of results of test mining project

The results of the test mining project should be documented (in a test mining study) and be used to develop the "Environmental Impact Study" according to exploitation regulation ??. The documentation should also inform about the remaining uncertainties.

(13) Miscellaneous

[Comment AWI: The timing of the test mining is missing – an aspect heavily discussed during the workshop. My general opinion would be to not center the decision on this so much on what is feasible from a contractor point of view (i.e., if shareholders would be willing to pay for test mining equipment before a exploitation contract has been negotiated). Instead this should be based on considerations of the temporal scales to fully assess the environmental impacts and consequences at the selected site. It may even be possible to leave the decision on whether test mining happens a the end of the exploration or the beginning of the exploitation phase to contractors as long as they plan in sufficient time for the monitoring and analyses required to produce a meaningful EIA for the application of a Plan of Work.]

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4. UK comments on the draft Standard for Test mining in response to Germany and Belgium's request to participants of the workshop on the Legal and Scientific aspects of Test Mining, Bremen, Germany (Dec 2024).

The UK would like to thank Germany and Belgum for leading the workshop on the legal and scientific aspects of Test Mining, Bremen, Germany (Dec 2024) and for sharing these draft test mining Standards for workshop participants consideration.

In general, the UK supports the need for Standards (and potentially Guidelines) to be developed for Test Mining. We consider it is very useful to have a draft starting point for discussions on the contents of such Standards and thank Germany and Belgium for the opportunity to comment.

The UK notes the work undertaken by the EIA/EIS informal intersessional working group, and recommends that the 'placement hierarchy' of what detail should sit in different levels of the Mining Code (Regulations, Annexes, Standards and Guidelines) developed by the group can form a helpful basis to guide the further work on Test Mining.

The UK strongly supports the need for Test Mining, in particular to reduce the uncertainty associated with extrapolating impacts of commercial mining. The UK highlights its view that data from a full ramp-up of different scales of testing of mining systems needs to be available prior to commencing

commercial production. For example, stage 1: component, stage 2: full system, stage 3: full scale. Then, a ramp up approach, implementing validation monitoring during commercial production.

We note this draft standard is titled 'Draft Standard for Test mining project before an application for a PoW is submitted'. However, in light of our position, that testing of mining systems is a longer term ramp-up process, we suggest consideration is given to developing a broader Standard that covers testing of mining systems, including objectives and data requirements, for testing before and after an application for a PoW for exploitation.

We also raise that if data is available already (e.g. from previous testing and/or other commercial production) which can be proven to meet the objectives and requirements of testing of mining systems in the regulations and the Standards (including consideration of cumulative effects), then duplication of that testing is not required. We therefore highlight that these Standards should cover this point too.

Furthermore, we are of the view that is it important to consider how the test mining Standards will link with other draft Standards and Guidelines under the exploitation regulations. In particular, how these Standards link with the EIA & EIS Standards and Guidelines, as it is our view that testing of mining systems must be part of the data which informs the EIA and subsequent EIS.

Specific Comments received

Draft Standard for Test mining project before an application for a PoW is submitted

UK COMMENT: We note there is currently no detail in these draft Standards on the EIA/EIS requirements for a test mining project. We understand this may be because how/what EIA regime to apply to test mining has not yet been resolved (e.g. standalone EIA requirements for test mining, or refer to EIA requirements already provided elsewhere, e.g. in exploitation regulations). But we highlight once this topic is agreed, consideration of what detail to include in these Standards is required.

(1) Purpose

The purpose of this standards is to determine the requirements which have to be fulfilled by a test mining project according to Exploitation regulation 48 ter paragraph 1.

(2) Scope of application

This standard is only applicable for test mining projects concerning the exploitation of polymetallic nodules.

UK COMMENT: We understand the rationale that these draft Standards are proposed to be developed just for nodules first, as they are the mineral resource which are expected to receive an application first in the Area. However, we consider that aside from the prescriptive spatial scales outlined in paragraph 10 below, nothing in these draft Standards is applicable only to nodules. We consider it would be best to produce a set of Standards that covers all mineral resources to the level possible, and then provide specific requirements where needed that are mineral resource specific (and this could be prioritised nodules first).

We also flag that test mining projects should be developed taking into consideration the relevant REMP. This may be highlighted in the regulations and/or in these draft Standards.

(3) Purpose of test mining

UK Comment: We have the view that each stage of the ramp-up process for test mining should have its own objectives and criteria which the contractor must demonstrate it meets through its proposal and testing outcomes . We suggest an overarching goal of each type of testing is included in the regulations, and then objectives and criteria should be contained in these Standards. We propose the objectives be included in this section (3). The ISA will then assess whether the goals, objectives and criteria have been met in the contractors application to test and it in its presented outcomes of the testing.

Test mining should allow to determine that an activity concerning the exploitation of polymetallic nodules will not cause harmful effects to the marine environment pursuant to Article 145 UNCLOs and that the environmental quality standards pursuant to Exploitation Regulation ?? will be complied with.

UK COMMENT: We recommend caution in the wording of these Standards. Test mining alone cannot determine whether an activity will cause harmful effects to the Marine Environment. Rather test mining shall be part of an evidence base that allows an assessment and evaluation of whether activities risk harmful effects, and shall inform the development and assessment of the application for a PoW as a whole (in particular the EIA/EIS).

It should allow to assess the performance, efficiency and economic viability of the exploitation as well as the efficacity of safety systems and monitoring systems.

UK COMMENT: It should be clear that the Contractor is expected to demonstrate its capability, and this demonstration is then for the ISA to assess.

The data should be the basis for the Environmental Impact assessment pursuant to Exploitation regulation ??.

UK COMMENT: As with comment above, careful wording is required here. The data from test mining is only 'part of' the data which forms the basis of the EIA.

Also, we highlight our general comment above that our view is that these Standards should cover the whole ramp-up process of testing of mining systems, and therefore the use of the data needs to be stipulated for each stage. For example, test mining in the 'feasibility study' wouldn't inform the basis of the EIA, but rather validate the conclusions/outcomes of the EIS, approved during the application for a PoW, using data from a larger scale test (DR25).

Test mining should also be used to identify options to optimize the used techniques.

UK COMMENT: We recommend not restricting to 'used techniques' only. Optimisation of used techniques suggests that the equipment used in TM automatically achieves a minimum standard. What if the tested equipment is found to be inadequate when tested in the field? We therefore recommend this paragraph should also include identification of suitable alternate techniques where needed.

(4) Test Mining and Modelling

Together with modelling according to the latest standard of development for modelling, the field data gathered by test mining projects should enable to make the determination mentioned in (3) Sentence 1.

UK COMMENT: We suggest that more common terms used in the exploitation regulation context, e.g. 'best available science' and/or 'best available techniques' may be better to use here than 'latest standard of development for modelling', unless the drafters consider there are specific modelling standards to be referenced?

Data gathered by test mining projects should be used to evaluate and to continuously improve the accuracy of the models used.

UK COMMENT: We agree with 'continuous improvement'. We highlight our earlier general comment that this Standard should cover the ramp-up process of test mining. This includes any testing that happens after the approval of a PoW, and includes any additional testing over the contract term, to facilitate 'continuous improvement' during the contract term.

(5) Contents

The contents to be addressed by the test mining should be related to the relevant aspects required for the EIS pursuant to Annex ?? Draft Regulation.

UK COMMENT: We believe that more detail is required on how to do this.

We also recommend clarity on what the difference is between this paragraph (5) 'contents' and paragraph (12) 'test mining study – documentation of results of test mining project'. Is the difference the same as the EIA being the process, and EIS being the reported outcomes of that process?

(6) Procedural prerequisites for the conduction of test mining projects

The contractor is only allowed to conduct a test mining project if a respective permission has granted by the international seabed authority pursuant (reference to revised provision in the exploration regulation or in the draft exploitation regulation) and a contract has been concluded

UK COMMENT: We strongly support that all stages of test mining require a contract granted by ISA. We consider only smaller scale testing (e.g. component testing) may be undertaken under exploration, and larger scale (full systems or full scale) must be undertaken under a test mining contract granted under exploitation. Any further testing after this will be conducted under an exploitation contract.

At the end of the paragraph, the wording 'and a contract has been concluded' is ambiguous and could read that test mining can only take place once the test mining contract term is finished. We question whether this drafting actually means when a contract is approved and in place, with which we would agree (as comment above)? If so, this should be clear.

(7) Test mining requirement in general

The test mining requirements concerning technical, temporal and spatial scale need to be determined project specific.

UK COMMENT: Further clarity is required on the intent and purpose of this paragraph/section title. Are sections 8, 9 and 10 below perhaps sub sections of overarching section 7?

We agree that specific scales need to be project specific, but we note they should be guided by the objectives and requirements of the regulations and Standards pertaining to test mining. However, we do consider some requirements with regard to determining appropriate scale may be Standardised in these draft Standards and these need further consideration and inclusion.

(8) Technical scale of test mining projects

Concerning the technical of a test mining project for the exploitation of polymetallic nodules the following should be complied with:

- The test should at least evaluate all components including the cumulative effects of the integrated application of the various components
- The technical scale could be smaller than the full technical system. The required technical scale must be determined for each element and for the technical approach applied.

(9) Temporal scale of test mining projects

The duration of a test mining project for the exploitation of polymetallic nodules should last over a reasonable duration in order to provide the information required.

If there are significant difference of the potentially affected ecosystems due the seasons, the temporal scale needs to be chosen accordingly to take into account these differences.

UK COMMENT: We think consideration is required with regard to how much additional detail is required in each of these sections. For example, which parameters of the potentially affected ecosystems should be considered? Why is only seasonal difference highlighted, over other types of natural variability? Where additional detail is required, consideration of where such issues are dealt with in other Standards and Guidelines, so they can be cross-referenced instead of duplicated here.

(10) Spatial scale of test mining projects

A test mining project for the exploitation of polymetallic nodules should span over an appropriate number of spatially separated locations within the contract area in order to account for differences (environmental, bathymetry, geology) in different areas.

The minimum size should be about 5-10 km2 for each of these fields.

UK COMMENT: We do not believe that we are at the stage of being able to put actual numbers on any of the scales at which testing should take place. This is in light of the current level of scientific knowledge. In any case, we are keen to understand the justification for why these numbers have been chosen.

We are of the view that each scale should be developed by the Contractor on a case-by-case basis per contract to meet clear objectives and requirements/criteria set out in these Standards to meet a higher-level goal set out in the regulations. The ISA will then assess the scales against such goals, objectives and criteria to make their decision.

In terms of the more specific criteria, at the minimum, the larger test mining projects (e.g. that are used to inform the application for a Plan of Work and the feasibility study before commercial production) should be adequate to inform the contractor and the ISA on the

impacts predicted to any habitat which is expected to be directly or indirectly impacted by mining activities. Relevant example criteria could include but are not limited to:

a. Extent and physical characteristics of the area being considered for exploitation
b. Biogeographic provinces represented within the area being considered for exploitation
c. Habitat/ terrain variability represented within the area being considered for exploitation
d. Inclusion of previous test mining project conclusions and estimation of relationships between pressure and state for a given impact pathway.
e. Whether full integration is required for each of the fields proposed for test mining?
f. Whether testing should be more extensive at a subset of fields?

(11)Capability for monitoring

The test mining project needs to show that the effects on the marine environment could be monitored in case of an exploitation project.

UK COMMENT: We recommend this paragraph should be clear that the contractor is doing this monitoring.

We recommend considering how this section links with the EMMP regulations and Standards and Guidelines.

We also think it needs to be clear in these Standards that the test mining monitoring needs to be designed so that it has a reasonable expectation of detecting unanticipated impacts. Then this section in particular should clarify that test mining should be part of the evidence base that informs that the EMMP for an exploitation project has a reasonable expectation of detecting unanticipated impacts.

(12)Test mining study – Documentation of results of test mining project

The results of the test mining project should be documented (in a test mining study) and be used to develop the "Environmental Impact Study" according to exploitation regulation ??. The documentation should also inform about the remaining uncertainties.

UK COMMENT: This section should be expanded to be more prescriptive of the expected content of the test mining study. For example, as a starting point:

This report is expected to have the following contents:

1. *Observations of test mining activities*
    a. *Performance of the collector vehicle, lifting or riser system and other componentry tested*
    b. *Environmental and ecological observations before, during and after the test*
    c. *Composition and volume of minerals recovered, and their anticipated usage*
2. *Evaluation of how the observations of the test mining activities compared with the preceding EIA/EIS, inclusive of impact pathways observed during the test that were not previously anticipated.*
3. *Description of post-testing activities (completed, in progress or planned) intended to address any improvements to mining equipment*

4. *Preliminary assessment of any residual uncertainty of any of the impact pathways identified*

(13)Miscellaneous

UK Comment: We are of the view that clarity is required on the use of term below, to be either cross-referenced to where they are explained in the exploitation regulations, or more detail provided in Standards (and/or Guidelines):

a. Commercial Production
b. Components (or 'Equipment' per UNCLOS terminology)
c. Cumulative (impacts)
d. Economic Viability
e. Efficiency
f. Integrated (test)
g. 'Latest Standard of Development' (if retained) or preferably 'Best Available Science' & 'Best Available Techniques'
h. Optimisation
i. Performance